

## PATENT ABSTRACTS OF JAPAN

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(21)Application number : 2003-125886 (71)Applicant : YOSHINO KOGYOSHO CO LTD

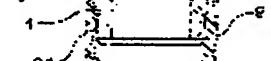
(22)Date of filing : 30.04.2003 (72)Inventor : IIMURA YOSHIHIRO  
KAWAHARA SACHIRO  
HIRASAWAZU TADAO

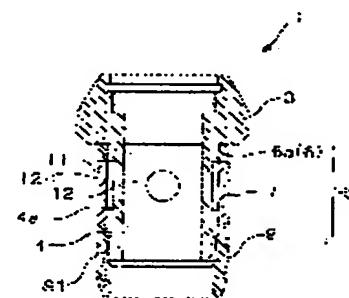
**(54) INNER DIAMETER REGULATING JIG FOR MOUTH CYLINDRICAL PART OF  
PREFORM**

**(57)Abstract:**

**PROBLEM TO BE SOLVED:** To provide an inner diameter regulating jig for the mouth cylindrical part of a preform, constituted so as to prevent the occurrence of unevenness such as a crater-shaped recessed part or the like of the inner peripheral surface of the mouth cylindrical part of the preform while certainly ensuring the sealability due to a cap by a simple structure.

**SOLUTION:** In this inner diameter regulating jig, a cylindrical regulating core, which is inserted in the mouth cylindrical part of the preform for a bottle made of a thermoplastic polyester resin to regulate a change in the inner diameter of the mouth cylindrical part caused by crystallization due to heat treatment, has a porous cylindrical body having a smooth part, of which the outer peripheral surface is made smooth, provided to the upper end part thereof and formed from an air permeable porous material over a predetermined height range under the smooth part.





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**CLAIMS**

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[Claim(s)]

[Claim 1]

It inserts in the opening cylinder part (22) of preforming for the bottles made of thermoplastic polyester resin (21). It has the tubed regulation core (5) which regulates change of the bore in crystallization by heat-treatment. The inside-diameter-calibration fixture of the preforming opening cylinder part which has the smooth section (6) which made this regulation core (5) the upper limit section, and made the peripheral face the shape of smooth, and was considered as the configuration which has the porosity barrel (7) which covers the predetermined height range of this smooth section (6) caudad, and is formed from the porous material of permeability.

[Claim 2]

The inside-diameter-calibration fixture of the preforming opening cylinder part according to claim 1 which made the range in which the smooth section (6) is prepared the height range of 1-7mm from the upper limit side of a regulation core (5).

[Claim 3]

The inside-diameter-calibration fixture of the preforming opening cylinder part according to claim 1 or 2 which set surface roughness of the smooth section (6) to 10 micrometers or less with the maximum height Ry.

[Claim 4]

The inside-diameter-calibration fixture of the preforming opening cylinder part according to claim 1, 2, or 3 which reduced the diameter of the upper limit section outer diameter of a porosity barrel (7), covered the peripheral face of this diameter reduction section (8) in the shape of coating, and was made into the smooth section (6).

[Claim 5]

The inside-diameter-calibration fixture of the preforming opening cylinder part according to claim 1, 2, or 3 which formed the smooth section (6) with the short cylinder object (6a) whose peripheral face is smooth [-like].

[Claim 6]

The inside-diameter-calibration fixture of the preforming opening cylinder part according to claim 1, 2, 3, 4, or 5 which formed a part for the point of a regulation core (5) with heat-resistant synthetic resin.

[Claim 7]

The inside-diameter-calibration fixture of the preforming opening cylinder part according to claim 1, 2, 3, 4, 5, or 6 which formed the porosity barrel (7) by sintered metal.

[Claim 8]

It has the base material (2) which \*\*\*\*\*ed the tubed support core (4) which reduced the diameter of an outer diameter in the shape of a coaxial core from the lower limit side of a thick tubed end face cylinder part (3),

Make a regulation core (5) carry out insertion inscribed [ of said support core (4) ], and the upper limit side of a regulation core (5) is made to contact the lower limit side of said end face cylinder part (3). It

grapples, a support core (4) and a regulation core (5) are fixed, a gap (11) is formed in the part which the peripheral face of said support core (4) and the inner skin of a porosity barrel (7) contact, and penetration \*\*\* (12) which is open for free passage to the barrel wall of this support core (4) in said gap (11) is formed,

Moreover, the inside-diameter-calibration fixture of the preforming opening cylinder part according to claim 1, 2, 3, 4, 5, 6, or 7 considered as the configuration in which an opening cylinder part (22) upper-limit side contacts the lower limit side of said end face cylinder part (3) where said regulation core (5) is inserted in an opening cylinder part (22).

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]****[Field of the Invention]**

This invention relates to the fixture for inside diameter calibration for regulating change of the bore in crystallization by heat-treatment of the opening cylinder part of preforming of the bottle made of polyester resin.

**[0002]****[Description of the Prior Art]**

The product made of polyester resin and especially the bottle made of polyethylene terephthalate resin (it is described as a PET bottle below.) are widely used as a container with the outstanding properties, such as a mechanical strength, gas barrier property, and transparency.

**[0003]**

Although biaxial extension blow molding of this is carried out and it is obtained after fabricating a PET bottle mainly by the blow molding method, using many biaxial extension blow molding methods especially and fabricating preforming as a test tube-like intermediate product with injection molding, for the application of carrying out heat restoration or heat-sterilizing contents liquid, heat-treating an opening cylinder part in order to raise the thermal resistance of the opening cylinder part of this preforming, and making it crystallize is performed. In addition, it will be in the condition of having milked the opening cylinder part by this crystallization.

**[0004]**

However, while properties, such as the rigidity of an opening cylinder part, a degree of hardness, and thermal resistance, improve by making it crystallize by heat-treatment, a consistency increases with crystallization, it may contract as the result, and dimensions, such as a bore of an opening cylinder part and an outer diameter, may deform into a contraction pan at an ununiformity, for example, a problem may arise to screwing nature with a cap, or the seal nature of an opening cylinder part with a cap.

**[0005]**

Although heat-treatment is conveyed giving rotation suitably to erection or a handstand condition with a conveyance means in support of preforming in many cases and being continuously heat-treated at hot blast, an infrared heater, etc. during this conveyance The core for inside diameter calibration is inserted in a preforming opening cylinder part, and the patent reference 1 has the publication about the approach of heat-treating, where the inner skin of an opening cylinder part is supported with a core in order to prevent a dimensional change, deformation, etc. accompanying the increment in a consistency, and contraction by heat-treatment of the above-mentioned opening cylinder part.

**[0006]**

However, if the core for inside diameter calibration as shown in the patent reference 1 is used, while the irregularity of a crater-like crevice etc. will occur in the inner skin of an opening cylinder part and seal nature with the cap of an opening cylinder part will become a defect, there is a problem that an appearance top also becomes unseemly.

## [0007]

The crater crevice of the above etc. one of the causes of main of generating The air which existed in the gap of opening cylinder part inner skin and the peripheral face of a core, or the gas which occurs from resin, such as PET, with heating of an opening cylinder part A refuge is lost with the core which contracts in the condition of having heated (diameter reduction) and fits into opening cylinder part inner circumference in the shape of adhesion, and it shuts up between a core peripheral face and opening cylinder part inner skin, and will be in a \*\*\*\* condition, and it will be thought by expanding with heating further that it is for the resin in a softening condition to deform. (Hereafter, above-mentioned air and gas are named generically, and it is described as air etc.)

## [0008]

The patent reference 2 has the publication about a means to control generating of the crevice in the above-mentioned opening cylinder part inner skin etc., and the main point forms the aeration means (various path clearance) for missing air etc. between the preforming opening cylinder parts by which fitting is carried out to the periphery of the fitting core section considering the tubed fitting core section into which the opening cylinder part of preforming fits as a configuration which has a sleeve on the periphery of the core cylinder section of a core body.

## [0009]

Moreover, the patent reference 2 has the publication about the approach of forming a cardiac cylinder part or a sleeve as one of the aeration means with the porous material which has permeability.

## [0010]

however, by the approach of using the above-mentioned porous material for a core Even if it carries out surface polish processing although the peripheral face of a core is porosity therefore, in addition, it becomes the shape of about several 10-micrometer split face. According to this split face heat treatment -- the time -- opening -- a cylinder part -- inner skin -- a crimp -- \*\* -- becoming -- a cap -- a seal -- a sex -- especially -- a cap -- 26 -- ' -- a top wall -- an inferior surface of tongue -- from -- \*\*\*\*\* (ing) -- having had -- a seal -- a cylinder -- a piece -- 27 -- ' -- opening -- a cylinder part -- upper limit -- the section -- inner skin -- a sealing surface -- 27 -- a -- ' -- a seal -- a sex -- inadequate -- becoming -- a problem -- generating . (Refer to drawing 7 )

## [0011]

in addition, the PET bottle 21 which drawing 7 shows an example in the condition of having carried out screwing attachment of cap 26' to opening cylinder part 22 of PET bottle 21", and is shown in this Fig. -- ' -- Screw section 23' for screwing cap 26' in the periphery of opening cylinder part 22', pilfer-proof packaging -- a function -- having had -- a cap -- 26 -- ' -- the closure -- a ring -- 30 -- ' -- stopping -- a sake -- a bead -- a ring -- 24 -- ' -- and -- a bottle -- holding -- a sake -- a support ring -- 25 -- ' -- having - a thing -- it is -- moreover -- a cap -- 26 -- ' -- sheathing -- a cylinder -- 28 -- ' -- the bottom -- fracture - a piece -- 29 -- ' -- minding -- inaccurate -- opening -- preventing -- a sake -- the closure -- a ring -- 30 - - ' -- having prepared -- being the so-called -- pilfer-proof packaging -- a function -- having had -- a cap - - it is . here -- a cap -- 26 -- ' -- depending -- PET -- a bottle -- 21 -- ' -- sealing -- opening -- a cylinder part -- 22 -- ' -- upper limit -- a field -- a cap -- 26 -- ' -- a top wall -- an inferior surface of tongue -- contact -- and -- opening -- a cylinder part -- 22 -- ' -- upper limit -- the section -- inner skin -- a seal -- a cylinder -- a piece -- 27 -- ' -- inscribed (sealing-surface 27a') -- depending -- a seal -- attaining -- having -- \*\*\*\* .

## [0012]

[Patent reference 1]

JP,61-24170,B

[Patent reference 2]

JP,2000-229347,A

## [0013]

[Problem(s) to be Solved by the Invention]

The technical technical problem of this invention is to cancel the trouble in the above-mentioned conventional technique, and offer the inside-diameter-calibration fixture of a preforming opening

cylinder part which is easy structure, and prevents generating of the irregularity of the crevice of the shape of a crater in opening cylinder part inner skin etc. while securing seal nature with a cap certainly.

[0014]

[Means for Solving the Problem]

The means of the inside of this invention which solves the above-mentioned technical problem, and invention according to claim 1,

It inserts in the opening cylinder part of preforming for the bottles made of thermoplastic polyester resin, and has the smooth section which made to have the tubed regulation core which regulates change of the bore in crystallization by heat-treatment, and this regulation core the upper limit section, and made the peripheral face the shape of smooth, and the predetermined height range of this smooth section caudad is covered, and it is in considering as the configuration which has the porosity barrel formed from the porous material of permeability.

[0015]

By the configuration of the claim 1 above-mentioned publication, the especially uneven contraction deformation in crystallization by heat-treatment of an opening cylinder part can be controlled by inserting the regulation core of an inside-diameter-calibration fixture in the opening cylinder part of preforming.

[0016]

Moreover, since it considered as the configuration which has the porosity barrel which covers the predetermined height range in a regulation core, and is formed from the porous material of permeability. Although the inner skin of an opening cylinder part and the peripheral face of a regulation core will be in the condition of having stuck since PET is in a softening condition and a bore contracts by crystallization further at the time of heat-treatment. The air which will be in a sealing condition can be made to be able to discharge through the barrel wall of this porosity barrel, and generating of the irregularity of the crevice of the shape of a crater in opening cylinder part inner skin etc. can be controlled effectively.

[0017]

Moreover, since it is a configuration with the smooth section which made the peripheral face the shape of smooth at the upper limit section of a regulation core, upper limit section inner skin of an opening cylinder part can be made into a smooth condition, and when sticking the piece of a seal cylinder of a cap to the upper limit section inner skin of an opening cylinder part and securing a seal especially, the maintenance reservation of the seal nature can be carried out certainly.

[0018]

In addition, the height range of a porosity barrel can be suitably decided in consideration of the configuration of opening cylinder parts, such as a bead ring and a support ring, observing generating situations, such as a crater-like crevice, experimentally. Especially a bead ring is broad, and since it is heavy-gage, and it will be in an elevated-temperature condition more and a big circumferential groove-like depression occurs in the height location corresponding to this bead ring location of opening cylinder part inner skin, it is desirable to carry out the height range of this porosity barrel to from directly under [ of the smooth section ] to the height location of the lower limit of this bead ring. Moreover, directly under [ from / smooth section ] to a tip can also be made into a porosity barrel.

[0019]

The means of invention according to claim 2 is in invention according to claim 1 to have made into the height range of 1-7mm the range in which the smooth section is prepared from the upper limit side of a regulation core. It is good to make into the height range of 2-5mm the range in which this smooth section is prepared more preferably from an upper limit side.

[0020]

When it may become insufficient [ less than 1mm ] securing [ of the seal nature by the piece of a seal cylinder of a cap ] and it exceeds 7mm, discharge of the air from this smooth section etc. will become inadequate, and the irregularity of a crater-like crevice etc. will occur.

[0021]

The means of invention according to claim 3 is to have set surface roughness of the smooth section (6) to 10 micrometers or less with the maximum height Ry.

[0022]

By the above-mentioned configuration according to claim 3, the opening cylinder part upper limit section inner skin of preforming can fully be graduated, and can hold certainly the seal by the piece of a seal cylinder of a cap. The maximum height Ry of surface roughness is JIS here. It is set by B0601-1994.

[0023]

The means of invention according to claim 4 is in invention of claims 1, 2, or 3 to have reduced the diameter of the outer diameter of the upper limit section of a porosity barrel, have covered the peripheral face of this diameter reduction section in the shape of coating, and have considered as the smooth section.

[0024]

It can constitute as a part of porosity barrel, without being able to graduate the outside surface of a porosity barrel easily and using especially the smooth section as another member by the above-mentioned configuration according to claim 4, since the front face of the diameter reduction section is coated, and the maintenance of a fixture etc. can be made easy by making a regulation core into easy structure.

[0025]

The means of invention according to claim 5 is in invention according to claim 1, 2, or 3 to form the smooth section with the short cylinder object whose peripheral face is smooth [-like ].

[0026]

The above-mentioned configuration according to claim 5 can constitute the smooth section from a short cylinder object which is another member, and can constitute the smooth section easily using the ring made from stainless steel which processed the peripheral face flat and smooth.

[0027]

The means of invention according to claim 6 is in invention according to claim 1, 2, 3, 4, or 5 to form a part for the point of a regulation core with heat-resistant synthetic resin.

[0028]

the above-mentioned configuration according to claim 6 -- a part for the point of a regulation core -- for example, if it has high thermal resistance and forms with heat-resistant synthetic resin, such as high PEEK (polyether ether ketone) of accumulation nature, while being able to carry out [ lightweight ]-izing of the inside-diameter-calibration fixture, since it is especially in the lower limit of an opening cylinder part and becomes the thick section, crystallization of the support-ring part to which heat treatment tends to become inadequate can fully be promoted.

[0029]

The means of invention according to claim 7 is in invention according to claim 1, 2, 3, 4, 5, or 6 to form a porosity barrel by sintered metal.

[0030]

By the above-mentioned configuration according to claim 7, by forming a porosity barrel by sintered metal, the thermal imitation nature in heating and the cooling process of an opening cylinder part can be improved, and heating and cooling processing can be carried out efficiently.

[0031]

The means of invention according to claim 8 is set to invention according to claim 1, 2, 3, 4, 5, 6, or 7, It has the base material which \*\*\*\*\*\*(ed) the tubed support core which reduced the diameter of an outer diameter in the shape of a coaxial core from the lower limit side of a thick tubed end face cylinder part, Make a regulation core carry out insertion inscribed [ of this support core ], and the upper limit side of a regulation core is made to contact the lower limit side of a end face cylinder part, it grapples and a support core and a regulation core are fixed,

A gap is formed in the part which the peripheral face of a support core and the inner skin of a porosity barrel contact,

Penetration \*\*\*\* which is open for free passage to the barrel wall of a support core in a gap is formed, Moreover, the thing considered as the configuration in which an opening cylinder part upper limit side contacts the lower limit side of a end face cylinder part where a regulation core is inserted in an opening cylinder part,

It is alike.

[0032]

The above-mentioned configuration according to claim 8 \*\*\*\*\* a support core in the shape of a coaxial core to the end face cylinder part which is the comparatively thick tube-like object which serves as a base of a tubed regulation core in an inside-diameter-calibration fixture. While a tubed regulation core is supported by the support core and the posture of the regulation core within preforming is secured certainly stably Since regulation core reinforcement is supple, thickness of the wall of the regulation core itself can also be made thin, and permeability can be enlarged more by making especially wall thickness of a porosity barrel thin.

[0033]

Moreover, the air of the letter of sealing etc. can be efficiently discharged through a porosity barrel, the above-mentioned gap, and a through tube by forming a gap in the part which the peripheral face of a support core and the inner skin of a porosity barrel contact, and forming penetration \*\*\*\* which is further open for free passage to the peripheral wall of a support core in a gap.

[0034]

Moreover, a support core can be inserted in regulation incore, the upper limit side of a regulation core can contact the lower limit side of a base barrel in the condition of having attached both with means, such as screwing, and having fixed, and where a support core is further inserted in the opening cylinder part of preforming, the upper limit side of an opening cylinder part can set up the insertion limitation of a regulation core clearly in contact with the lower limit side of a end face cylinder part.

[0035]

[Embodiment of the Invention]

Next, it explains based on the example which shows the gestalt of operation of this invention to a drawing. Drawing 1 of drawing 1 - drawing 3 is the whole drawing of longitudinal section about the 1st example of the inside-diameter-calibration fixture 1 of this invention, it decomposes into four members of the (a) base material 2, (b) short cylinder object 6a, (c) porosity barrel 7, and (d) tip cylinder 9, and drawing 2 is shown, and drawing 3 shows the condition of having inserted the regulation core 5 of this inside-diameter-calibration fixture 1 in the opening cylinder part 22 of preforming 21.

[0036]

The preforming 21 of the PET bottle shown in drawing 3 has the support ring 25 for holding the bead ring 24 and bottle which achieve the function for a stop of the screw section 23 for screwing cap 26 in the periphery of the opening cylinder part 22 and the closure ring of the cap for pilfer-proof packaging (also see drawing 7 ). In addition, the opening cylinder part 22 shown in drawing 3 is the so-called opening cylinder part for heatproofs.

[0037]

Although bore \*\*\*\*\* 1 of this 1st example consists of a base material 2, short cylinder object 6a, a porosity barrel 7, and four members of a point 9 as mentioned above, it is the configuration where the cylinder-like support core 4 was \*\*\*\*\* (ed) in the shape of a coaxial core from the lower limit side of the end face cylinder part 3 which a base material 2 is a product made of heat-resistant synthetic resin, and has the shape of a comparatively thick short cylinder object. Moreover, so much, the support core 4 has the same bore in the end face cylinder part 3, and reduces the diameter of an outer diameter to it.

[0038]

Moreover, the part for the connection fixture B for connecting with the device part for inserting the inside-diameter-calibration fixture 1 in conveyance or the opening cylinder part 22 of preforming 21 in heating apparatus to screw is formed in the upper part of the end face cylinder part 3. (Refer to drawing 3 ) Comparatively broad circumferential groove 4a for forming a gap 11 between the inner skin of the porosity barrel 5 mentioned later is formed in the peripheral face of the support core 4 again, it is the

height location of this circumferential groove 4a further, and the through tube 12 is formed in four places of an isocentre include angle.

[0039]

In this example, the tip cylinder 9 used as short cylinder object 6a, the porosity barrel 7, and a point is attached, and it joins together, is inscribed in the inner skin of the opening cylinder part 22 of preforming 21 in the case of heat treatment, and the regulation core 5 of the shape of a cylinder which regulates a bore is formed. Among these, short cylinder object 6a can use the short cylinder object made from stainless steel, and in this example, it is 3mm, and the height carries out data smoothing of the peripheral face, makes surface roughness small, and arranges the smooth section 6 in the upper limit section of the regulation core 5.

[0040]

Moreover, the porosity barrel 7 has the permeability which is cylindrical, is formed from sintered metal and crosses a barrel wall. (For example, POSERAKKUSU II by Sintokogio, Ltd. etc. can be used.) Although use \*\*\*\*\* is possible also for the thing made of the product made from a ceramic, or heat-resistant resin as a porous body which has permeability, it is desirable to use the thing made from sintered metal which has comparatively high thermal conductivity from heating of the opening cylinder part 22 or the point of the thermal flattery nature in the case of cooling.

[0041]

Moreover, in this example, heat resistant resin, such as PEEK (polyether ether ketone), can be used for the tip cylinder 9 which forms the point of the regulation core 5, it makes it the configuration whose diameter was gently reduced towards the tip, and makes easy insertion actuation of the regulation core 5 to the opening cylinder part 22.

[0042]

If it has high thermal resistance, for example and a point is formed like this example with heat-resistant synthetic resin, such as high PEEK (polyether ether ketone) of accumulation nature, while being able to carry out [ lightweight ]-izing of the inside-diameter-calibration fixture 1, since it is especially in the lower limit of the opening cylinder part 22 and becomes the thick section, crystallization of support-ring 25 part to which heat treatment tends to become inadequate can fully be promoted.

[0043]

It is attached outside the support core 4 in order of short cylinder object 6a, the porosity barrel 7, and the tip cylinder 9, is inserted in it, finally the assembly of each part material which gave [ above-mentioned ] explanation screws the tip cylinder 9 at the tip of a support core, attaches a base material (screw section S1 reference in drawing 1 ) 2, and the regulation core 5, and joins together. Thus, in the condition of having attached and joined together, the upper limit side (namely, upper limit side of short cylinder object 6a) of the regulation core 5 is in the condition which contacted the lower limit side of the end face barrel 3. Moreover, the support core 4 is in the condition inscribed in the regulation core 5, and in case it inserts the regulation core 5 in the opening cylinder part 22 further, the upper limit side of the opening cylinder part 22 contacts the lower limit side of the end face barrel 3, and it serves as an insertion limitation of the regulation core 5.

[0044]

Thus, since the reinforcement of the regulation core 5 is suppliable with the support core 4 inscribed in while the cylinder-like regulation core 5 is supported by the base material 2 and the posture of the regulation core 5 within preforming 21 is secured certainly stably, thickness of the wall of regulation core 5 the very thing can also be made thin, and permeability can be enlarged more by making thin especially the barrel wall of the porosity barrel 7.

[0045]

Moreover, the air which consists in the contact parts of the inner skin of the opening cylinder part 22 and the peripheral face of the regulation core 5 in the shape of sealing can be efficiently discharged through penetration \*\*\* 12 formed in the gap 11 and circumferential groove 4a which were formed in the part which the peripheral face of the support core 4 and the inner skin of the porosity barrel 7 contact by circumferential groove 4a formed in the barrel wall of the porosity barrel 7 with permeability, and the

support core 4.

[0046]

In addition, although the short cylinder object 6a itself does not have permeability, since it is in the condition that it was inscribed in the upper limit section of the opening cylinder part 22, and the porosity barrel 7 with permeability adjoined the lower limit section By setting up the height of this short cylinder object 6a suitable for necessary minimum height, air etc. can be made to be able to discharge in the vertical direction and generating of irregularity, such as crater-like concave in this contact part, can be controlled.

[0047]

Moreover, although the height range which arranges the porosity barrel 7 is carried out to the abbreviation lower limit section of the bead ring 24 in this example in order to control generating of the big depression of the shape of a circumferential groove in the height location corresponding to bead ring 24 location of the inner skin of the opening cylinder part 22 This range can be suitably decided in consideration of the configuration of the opening cylinder part 22 of this bead ring 24 and support-ring 23 grade, observing generating situations, such as a crater-like crevice, experimentally.

[0048]

Drawing 4 is drawing of longitudinal section showing the porosity barrel 7 of the 2nd example of the inside-diameter-calibration fixture of this invention. This example makes other configurations and a configuration be the same as that of the 1st example, a step is prepared in the upper limit section of the peripheral face of the cylinder-like porosity barrel 7, the diameter reduction section 8 is formed in the shape of a periphery, this diameter reduction section 8 is covered with a heat-resistant coating etc. in the shape of coating, coating layer 6b is formed, an outside surface is made smooth, and this coated part demonstrates the function of the smooth section 6.

[0049]

It can constitute as a part of porosity barrel 7, without using especially the smooth section 5 as another member by the configuration of the 2nd example, and the maintenance of a fixture etc. can be made easy.

[0050]

Drawing 5 is the configuration of the 3rd example of the inside-diameter-calibration fixture of this invention being shown, and having lost the part of the support core 4 of the base material 2 of the 1st example. It is the configuration which combined four members, the end face cylinder part 3, the short cylinder object 6, the porosity barrel 7, and the tip cylinder 9, by three screw bond parts S2 and S3 and S4. \*\*\*\*\* can be made to correspond according to the configuration or heat treatment conditions of the opening cylinder part 2 with the combination of the short cylinder object 6 which constitutes the regulation core 5, the porosity barrel 7, and the tip cylinder 9.

[0051]

Drawing 6 shows the 4th example of the inside-diameter-calibration fixture of this invention, loses the part of the support core 4 of a base material 2 like the 3rd example, makes the upper limit section the diameter reduction section 8 for the regulation core 5 like the 2nd example, it can be constituted from one member of the porosity barrel 7 in which coating layer 6b was formed, can constitute the regulation core 5 from one member, and can make a maintenance etc. easy.

[0052]

#### [Effect of the Invention]

Since this invention has the above-mentioned composition, it does so the effectiveness taken below. By covering the predetermined height range in a regulation core, and considering as the configuration which has the porosity barrel formed from the porous material of permeability, if it is in invention according to claim 1 It will be in a sealing condition, and the barrel wall of this porosity barrel can be penetrated and the air which expanded can be made to discharge by heat-treatment. While the sealed generating gas can control effectively generating of the irregularity of the crevice of the shape of a crater in the interior of the opening cylinder part considered to be a key factor etc. By considering as a configuration with the smooth section which made the peripheral face the shape of smooth at the upper

limit section of a regulation core, upper limit section inner skin of an opening cylinder part can be made into a smooth condition, and the maintenance reservation of the seal nature at the time of sticking the piece of a seal cylinder of a cap and carrying out the seal of the opening cylinder part can be carried out certainly.

[0053]

If it is in invention according to claim 2, while fully securing from the upper limit side of a regulation core the seal nature according the range in which the smooth section is prepared to the piece of a seal cylinder of a cap object the height range of 1-7mm, and by considering as the height range of 2-5mm more preferably, generating of the crevice of the shape of a crater in the upper limit section of an opening cylinder part etc. can be controlled certainly.

[0054]

If it is in invention according to claim 3, the seal nature by the piece of a seal cylinder of a cap can be certainly held by setting surface roughness of the smooth section to 10 micrometers or less by Rmax.

[0055]

If it is in invention according to claim 4, the diameter of the outer diameter of the upper limit section of a porosity barrel can be reduced, and it can constitute as a part of porosity barrel, without using especially the smooth section as another member by covering in the shape of coating and considering as the smooth section, and the maintenance of a fixture etc. can be made easy.

[0056]

If it is in invention according to claim 5, the smooth section can be easily constituted using the ring made from stainless steel which processed the peripheral face flat and smooth by forming the smooth section with the short cylinder object whose peripheral face is smooth [-like ].

[0057]

If it is in invention according to claim 6, while being able to carry out [ lightweight ]-izing of the inside-diameter-calibration fixture by having high thermal resistance and forming with heat-resistant synthetic resin, such as high PEEK (polyether ether ketone) of accumulation nature, crystallization of a supporting part can fully be promoted.

[0058]

If it is in invention according to claim 7, by forming a porosity barrel by sintered metal, the thermal imitation nature in heating and the cooling process of an opening cylinder part can be improved, and heating and cooling processing can be carried out efficiently.

[0059]

Since regulation core reinforcement is suppliable while a tubed regulation core is supported by the support core and the posture of the regulation core within preforming is stably secured certainly by using the base material which has a support core, if it is in invention according to claim 8, thickness of the wall of the regulation core itself can also be made thin, and permeability can be enlarged more by making especially wall thickness of a porosity barrel thin.

[Brief Description of the Drawings]

[Drawing 1] Drawing of longitudinal section showing the 1st example of the fixture for inside diameter calibration of this invention.

[Drawing 2] Drawing of longitudinal section disassembling and showing the fixture of drawing 1 .

[Drawing 3] Drawing of longitudinal section showing the fixture of drawing 1 where a regulation core is inserted in the opening cylinder part of preforming.

[Drawing 4] Drawing of longitudinal section showing the porosity barrel in the 2nd example of the fixture for inside diameter calibration of this invention.

[Drawing 5] Drawing of longitudinal section showing the 3rd example of the fixture for inside diameter calibration of this invention.

[Drawing 6] Drawing of longitudinal section showing the 4th example of the fixture for inside diameter calibration of this invention.

[Drawing 7] The explanatory view showing the condition of having made the cap screwing in a PET bottle with drawing of longitudinal section.

## [Description of Notations]

1 ; Inside-Diameter-Calibration Fixture  
2 ; Base Material  
3 ; End Face Cylinder Part  
4 ; Support Core  
4a; Circumferential groove  
5 ; Regulation Core  
6 ; Smooth Section  
6a; Short cylinder object  
6b; Coating layer  
7 ; Porosity Barrel  
8 ; Diameter Reduction Section  
9 ; Tip Cylinder  
11; Gap  
12; Through tube  
21; Preforming  
21';P ET bottle  
22 22'; Opening cylinder part  
23 23'; Screw section  
24 24'; Bead ring  
25 25'; Support ring  
26'; Cap  
27'; Piece of a seal cylinder  
27a'; sealing surface  
28'; Sheathing cylinder  
29'; Piece of fracture  
30'; Closure ring  
S1, S2, S3, S4; Screw bond part  
B ; Connection fixture

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[Translation done.]

**\* NOTICES \***

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] Drawing of longitudinal section showing the 1st example of the fixture for inside diameter calibration of this invention.

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[Drawing 5] Drawing of longitudinal section showing the 3rd example of the fixture for inside diameter calibration of this invention.

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[Drawing 7] The explanatory view showing the condition of having made the cap screwing in a PET bottle with drawing of longitudinal section.

**[Description of Notations]**

1 ; Inside-Diameter-Calibration Fixture

2 ; Base Material

3 ; End Face Cylinder Part

4 ; Support Core

4a; Circumferential groove

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7 ; Porosity Barrel

8 ; Diameter Reduction Section

9 ; Tip Cylinder

11; Gap

12; Through tube

21; Preforming

21' ;P ET bottle

22 22'; Opening cylinder part

23 23'; Screw section

24 24'; Bead ring

25 25'; Support ring

26'; Cap

27'; Piece of a seal cylinder

27a'; sealing surface

28'; Sheathing cylinder  
29'; Piece of fracture  
30'; Closure ring  
S1, S2, S3, S4; Screw bond part  
B ; Connection fixture

---

[Translation done.]

**\* NOTICES \***

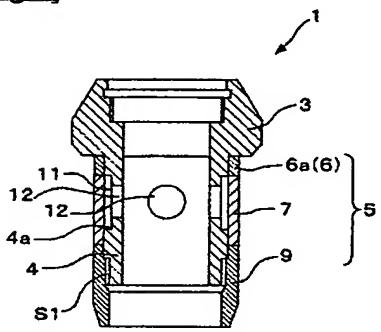
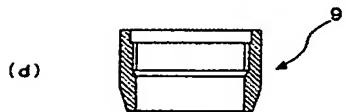
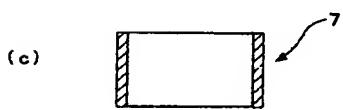
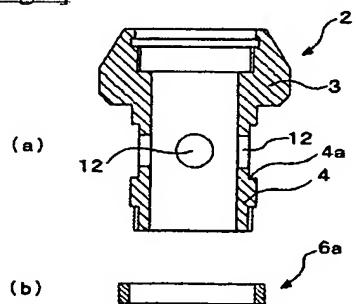
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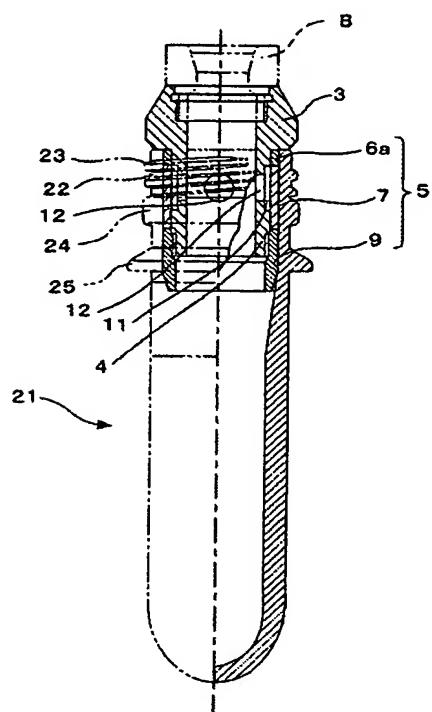
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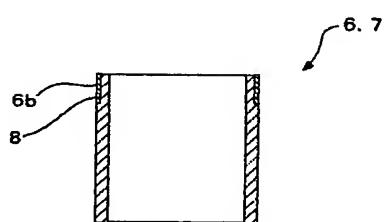
**DRAWINGS**

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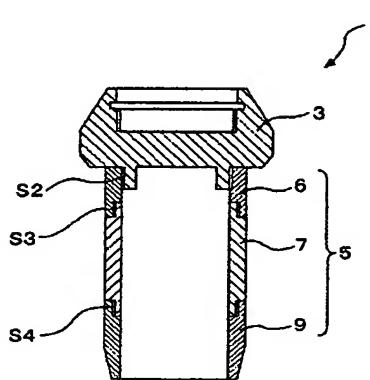
**[Drawing 1]****[Drawing 2]****[Drawing 3]**



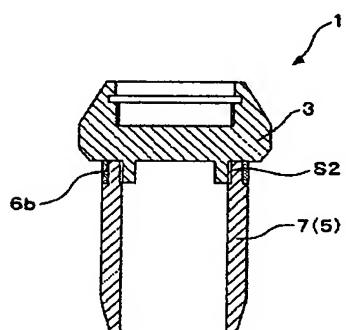
[Drawing 4]



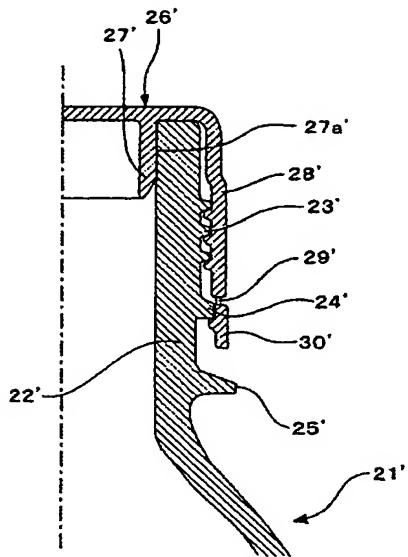
[Drawing 5]



[Drawing 6]



[Drawing 7]



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[Translation done.]

## INNER DIAMETER REGULATING JIG FOR MOUTH CYLINDRICAL PART OF PREFORM

**Patent number:** JP2004330460  
**Publication date:** 2004-11-25  
**Inventor:** IIMURA YOSHIHIRO; KAWAHARA SACHIRO;  
 HIRASAWAZU TADAO  
**Applicant:** YOSHINO KOGYOSHO CO LTD  
**Classification:**  
 - **international:** B29C49/64; B29C49/64; (IPC1-7): B29C49/64;  
 B29K67/00; B29L22/00  
 - **european:**  
**Application number:** JP20030125886 20030430  
**Priority number(s):** JP20030125886 20030430

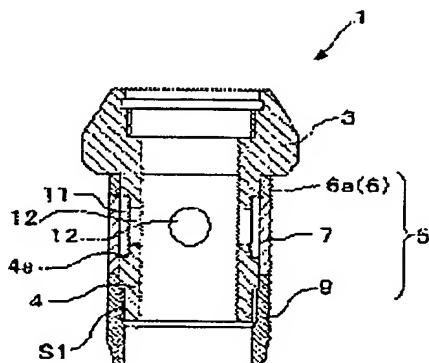
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### Abstract of JP2004330460

**PROBLEM TO BE SOLVED:** To provide an inner diameter regulating jig for the mouth cylindrical part of a preform, constituted so as to prevent the occurrence of unevenness such as a crater-shaped recessed part or the like of the inner peripheral surface of the mouth cylindrical part of the preform while certainly ensuring the sealability due to a cap by a simple structure.

**SOLUTION:** In this inner diameter regulating jig, a cylindrical regulating core, which is inserted in the mouth cylindrical part of the preform for a bottle made of a thermoplastic polyester resin to regulate a change in the inner diameter of the mouth cylindrical part caused by crystallization due to heat treatment, has a porous cylindrical body having a smooth part, of which the outer peripheral surface is made smooth, provided to the upper end part thereof and formed from an air permeable porous material over a predetermined height range under the smooth part.

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B29L 22:00

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(71) 出願人 000006909  
株式会社吉野工業所  
東京都江東区大島3丁目2番6号  
100076598  
弁理士 渡辺 一豊

(74) 代理人 飯村 好宏  
千葉県松戸市松台310 株式会社吉野工業所松戸工場内

(72) 発明者 河原 幸朗  
東京都江東区大島3丁目2番6号 株式会社吉野工業所内

(72) 発明者 平沢津 忠雄  
東京都江東区大島3丁目2番6号 株式会社吉野工業所内

最終頁に続く

(54) 【発明の名称】 プリフォーム口筒部の内径規制治具

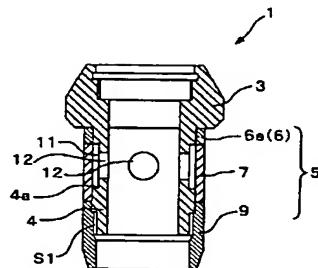
## (57) 【要約】

【課題】 本発明の技術的課題は、簡単な構造で、キャップによるシール性を確実に確保しながら、口筒部内周面におけるクレーティ状の凹部等の凸凹の発生を防止するプリフォーム口筒部の内径規制治具を提供することにある。

【解決手段】 热可塑性ポリエチレン樹脂製ボトル用のプリフォームの口筒部に嵌入して、加熱処理による結晶化における内径の変化を規制する筒状の規制コアを、上端部に外周面を平滑状にした平滑部を有し、この平滑部の下方に所定の高さ範囲に亘って、通気性の多孔質材料から形成される多孔質筒体を有する構成とする。

【選択図】

図 1



## 【特許請求の範囲】

## 【請求項 1】

熱可塑性ポリエスチル樹脂製ボトル用のプリフォーム（21）の口筒部（22）に嵌入して、加熱処理による結晶化における内径の変化を規制する筒状の規制コア（5）を有し、該規制コア（5）を、上端部に外周面を平滑状にした平滑部（6）を有し、該平滑部（6）の下方に所定の高さ範囲に亘って、通気性の多孔質材料から形成される多孔質筒体（7）を有する構成としたプリフォーム口筒部の内径規制治具。

## 【請求項 2】

平滑部（6）を設ける範囲を、規制コア（5）の上端面から1～7mmの高さ範囲とした、請求項1記載のプリフォーム口筒部の内径規制治具。 10

## 【請求項 3】

平滑部（6）の表面粗さを最大高さRyで10μm以下とした請求項1または2記載のプリフォーム口筒部の内径規制治具。

## 【請求項 4】

多孔質筒体（7）の上端部外径を縮径し、該縮径部（8）の外周面をコーティング状に被覆して、平滑部（6）とした請求項1、2または3記載のプリフォーム口筒部の内径規制治具。

## 【請求項 5】

平滑部（6）を外周面が平滑状である短円筒体（6a）で形成した、請求項1、2または3記載のプリフォーム口筒部の内径規制治具。 20

## 【請求項 6】

規制コア（5）の先端部分を耐熱性合成樹脂で形成した、請求項1、2、3、4または5記載のプリフォーム口筒部の内径規制治具。

## 【請求項 7】

多孔質筒体（7）を焼結金属で形成した、請求項1、2、3、4、5または6記載のプリフォーム口筒部の内径規制治具。

## 【請求項 8】

肉厚筒状の基端筒部（3）の下端面から同軸心状に外径を縮径した筒状の支持コア（4）を垂下設した支持体（2）を有し、

前記支持コア（4）を規制コア（5）に嵌入内接させ、規制コア（5）の上端面を前記基端筒部（3）の下端面に当接させて、支持コア（4）と規制コア（5）を組付き固定し、前記支持コア（4）の外周面と多孔質筒体（7）の内周面が接触する部分に間隙（11）を形成し、該支持コア（4）の筒壁に前記間隙（11）に連通する貫通孔（12）を形成し、 30

また前記規制コア（5）を口筒部（22）に嵌入した状態で、口筒部（22）上端面が前記基端筒部（3）の下端面に当接する構成とした、請求項1、2、3、4、5、6または7記載のプリフォーム口筒部の内径規制治具。

## 【発明の詳細な説明】

## 【0001】

## 【発明の属する技術分野】

本発明は、ポリエスチル樹脂製ボトルのプリフォームの口筒部の加熱処理による結晶化における内径の変化を規制するための内径規制用治具に関するものである。 40

## 【0002】

## 【従来の技術】

ポリエスチル樹脂製、特にポリエチレンテレフタレート樹脂製のボトル（以下PETボトルと記す。）は、機械的強度、ガスバリア性、透明性等の優れた特性を持つ容器として広く利用されている。

## 【0003】

PETボトルは主としてプロー成形法で成形され、なかでも2軸延伸プロー成形法が多く用いられており、射出成形で試験管状の中間体としてのプリフォームを成形した後、これ

を2軸延伸プロー成形して得られるが、内容液を熱充填する、或いは加熱滅菌する等の用途では、このプリフォームの口筒部の耐熱性を向上させる目的で口筒部を加熱処理して結晶化させることが行われている。なお、この結晶化により口筒部は白化した状態となる。

【0004】

しかしながら加熱処理により結晶化させることにより口筒部の剛性、硬度、耐熱性等の性質が向上する反面、結晶化に伴なって密度が増加し、その結果として収縮して口筒部の内径、外径等の寸法が縮小さらには不均一に変形し、たとえばキャップとの螺合性あるいはキャップによる口筒部のシール性に問題が生じる場合がある。

【0005】

加熱処理は多くの場合プリフォームを直立もしくは倒立状態に支持して、適宜搬送手段により回転を与えるながら搬送し、この搬送中に熱風、赤外線ヒータ等で連続的に加熱処理を行なうが、特許文献1には、上記した口筒部の加熱処理による密度の増加、収縮に伴う寸法変化や変形等を防止する目的で、プリフォーム口筒部に内径規制用のコアを挿入し、口筒部の内周面をコアで支持した状態で加熱処理する方法についての記載がある。

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【0006】

しかしながら、特許文献1に示されるような内径規制用のコアを用いると、口筒部の内周面にクレータ状の凹部等の凹凸が発生し、口筒部のキャップによるシール性が不良になると共に、見かけ上も不体裁になるという問題がある。

【0007】

上記クレータ状の凹部等の発生の主原因の一つは、口筒部内周面とコアの外周面との間隙に存在していた空気、あるいは口筒部の加熱によってPET等の樹脂から発生するガスが、加熱した状態で収縮（縮径）して口筒部内周に密着状に嵌合するコアにより逃げ場が失われ、コア外周面と口筒部内周面との間に閉じ込められた状態となり、さらには加熱により膨張することにより、軟化状態にある樹脂が変形するためであると考えられる。（以下、上記の空気およびガスを総称して空気等と記す。）

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【0008】

特許文献2は上記の口筒部内周面における凹部等の発生を抑制する手段についての記載があり、その要点はプリフォームの口筒部が嵌合する筒状の嵌合コア部をコア本体の芯筒部の外周にスリープを有する構成として、嵌合コア部の外周に嵌合されるプリフォーム口筒部との間に空気等を逃すための通気手段（各種クリアランス）を形成したものである。

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【0009】

また特許文献2には通気手段のひとつとして、心筒部あるいはスリープを通気性を有する多孔質材料で形成する方法についての記載がある。

【0010】

しかしながら、コアに上記多孔質材料を用いる方法では、コアの外周面が多孔質であるがゆえに表面研磨処理したとしてもなお数 $10\text{ }\mu\text{m}$ 程度の粗面状となり、この粗面により、熱処理の際、口筒部の内周面がシボ状となり、キャップのシール性、特にキャップ26'の頂壁下面から垂下設されたシール筒片27'と口筒部上端部内周面とのシール面27a'でのシール性が不十分になる問題が発生する。（図7参照）

【0011】

なお、図7は、PETボトル21'の口筒部22'にキャップ26'を螺合組付けした状態の一例を示すものであり、本図で示されるPETボトル21'は、口筒部22'の外周に、キャップ26'を螺合するためのネジ部23'、ピルファーブルーフ機能を有したキャップ26'の封止リング30'を係止するためのビードリング24'およびボトルを保持するためのサポートリング25'を有するものであり、またキャップ26'は外装筒28'の下に破断片29'を介して不正開封を防止するための封止リング30'を設けた所謂ピルファーブルーフ機能を有したキャップである。ここでキャップ26'によるPETボトル21'の密閉は口筒部22'の上端面とキャップ26'の頂壁の下面との当接、および口筒部22'の上端部内周面へのシール筒片27'の内接（シール面27a'）によるシールにより達成されている。

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【0012】

【特許文献1】

特公昭61-24170号公報

【特許文献2】

特開2000-229347号公報

【0013】

【発明が解決しようとする課題】

本発明の技術的課題は、上記した従来技術における問題点を解消して、簡単な構造で、キャップによるシール性を確実に確保しながら、口筒部内周面におけるクレータ状の凹部等の凹凸の発生を防止するプリフォーム口筒部の内径規制治具を提供することにある。

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【0014】

【課題を解決するための手段】

上記技術的課題を解決する本発明の内、請求項1記載の発明の手段は、熱可塑性ポリエスチル樹脂製ボトル用のプリフォームの口筒部に嵌入して、加熱処理による結晶化における内径の変化を規制する筒状の規制コアを有すること、この規制コアを、上端部に外周面を平滑状にした平滑部を有し、この平滑部の下方に所定の高さ範囲に亘って、通気性の多孔質材料から形成される多孔質筒体を有する構成とすること、にある。

【0015】

上記請求項1記載の構成により、内径規制治具の規制コアをプリフォームの口筒部に嵌入することにより、口筒部の加熱処理による結晶化における、特には不均一な収縮変形を抑制することができる。

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【0016】

また、規制コアを所定の高さ範囲に亘って、通気性の多孔質材料から形成される多孔質筒体を有する構成としたので、加熱処理時にはP E T樹脂は軟化状態であり、さらには結晶化により内径が収縮するので、口筒部の内周面と規制コアの外周面は密着した状態となるが、密閉状態となる空気等をこの多孔質筒体の筒壁を通して排出させることができ、口筒部内周面におけるクレータ状の凹部等の凹凸の発生を効果的に抑制することができる。

【0017】

また、規制コアの上端部に外周面を平滑状にした平滑部を有した構成であるので、口筒部の上端部内周面を平滑な状態とすることができ、特には口筒部の上端部内周面にキャップのシール筒片を密着させてシールを確保する場合において、シール性を確実に維持確保することができる。

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【0018】

なお、多孔質筒体の高さ範囲は、ビードリング、サポートリング等の口筒部の形状を考慮して、またクレータ状の凹部等の発生状況を実験的に観察しながら適宜決めることができる。特にビードリングは幅広で厚肉であるのでより高温状態となり、口筒部内周面のこのビードリング位置に対応する高さ位置に周溝状の大きな凹みが発生するため、この多孔質筒体の高さ範囲を平滑部の直下からこのビードリングの下端の高さ位置までとするのが好ましい。また、平滑部直下から先端までを多孔質筒体とすることもできる。

【0019】

請求項2記載の発明の手段は、請求項1記載の発明において、平滑部を設ける範囲を、規制コアの上端面から1~7mmの高さ範囲としたこと、にある。より好ましくはこの平滑部を設ける範囲を上端面から2~5mmの高さ範囲とするのが良い。

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【0020】

1mm未満ではキャップのシール筒片によるシール性の確保が不十分となる場合があり、7mmを超える場合にはこの平滑部からの空気等の排出が不十分になりクレータ状の凹部等の凹凸が発生してしまう。

【0021】

請求項3記載の発明の手段は、平滑部(6)の表面粗さを最大高さRyで10μm以下としたこと、にある。

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## 【0022】

請求項3記載の上記構成により、プリフォームの口筒部上端部内周面は十分に平滑化してキャップのシール筒片によるシールを確実に保持することができる。ここで表面粗さの最大高さRyはJIS B0601-1994で定められるものである。

## 【0023】

請求項4記載の発明の手段は、請求項1、2または3の発明において、多孔質筒体の上端部の外径を縮径し、この縮径部の外周面をコーティング状に被覆して、平滑部としたことにある。

## 【0024】

請求項4記載の上記構成により、縮径部の表面をコーティングするので多孔質筒体の外表面を容易に平滑化することができ、平滑部を特に別部材とすることなく多孔質筒体の一部として構成することができ、規制コアを簡単な構造として治具のメンテナンス等を容易にすることができます。10

## 【0025】

請求項5記載の発明の手段は、請求項1、2または3記載の発明において、平滑部を外周面が平滑状である短円筒体で形成すること、にある。

## 【0026】

請求項5記載の上記構成は、平滑部を別部材である短円筒体で構成するものであり、たとえば外周面を平滑に処理したステンレス製のリング等を使用して容易に平滑部を構成することができる。20

## 【0027】

請求項6記載の発明の手段は、請求項1、2、3、4または5記載の発明において、規制コアの先端部分を耐熱性合成樹脂で形成すること、にある。

## 【0028】

請求項6記載の上記構成により、規制コアの先端部分を、たとえば高い耐熱性を有し、蓄熱性の高いPEEK(ポリエーテルエーテルケトン)等の耐熱性合成樹脂で形成すると、内径規制治具を軽量化できると共に、特に口筒部の下端にあり肉厚部となるため熱処理が不十分になりやすいサポートリング部分の結晶化を十分に促進することができる。

## 【0029】

請求項7記載の発明の手段は、請求項1、2、3、4、5または6記載の発明において、多孔質筒体を焼結金属で形成することにある。30

## 【0030】

請求項7記載の上記構成により、多孔質筒体を焼結金属で形成することにより、口筒部の加熱および冷却工程における熱的な追随性をよくして、加熱および冷却処理を効率良く実施することができる。

## 【0031】

請求項8記載の発明の手段は、請求項1、2、3、4、5、6または7記載の発明において、40

肉厚筒状の基端筒部の下端面から同軸心状に外径を縮径した筒状の支持コアを垂下設した支持体を有すること、

この支持コアを規制コアに嵌入内接させ、規制コアの上端面を基端筒部の下端面に当接させて、支持コアと規制コアを組付き固定し、

支持コアの外周面と多孔質筒体の内周面が接触する部分に間隙を形成し、支持コアの筒壁に間隙に連通する貫通孔を形成し、

また規制コアを口筒部に嵌入した状態で、口筒部上端面が基端筒部の下端面に当接する構成とすること、

にある。

## 【0032】

請求項8記載の上記構成は、内径規制治具において筒状の規制コアの基盤となる比較的肉厚の筒状体である基端筒部に同軸心状に支持コアを垂下設したものであり、支持コアによ50

り筒状の規制コアが支持され、プリフォーム内での規制コアの姿勢が安定的に確保されると共に、規制コア強度を補うことができるので、規制コア自体の壁の厚さを薄くすることもでき、特に多孔質筒体の壁厚を薄くすることにより通気性をより大きくすることができます。

#### 【0033】

また、支持コアの外周面と多孔質筒体の内周面が接触する部分に間隙を形成し、さらには支持コアの周壁に間隙に連通する貫通項孔を形成することにより、密閉状の空気等を、多孔質筒体、上記間隙そして貫通孔を経て効率良く排出することができる。

#### 【0034】

また、支持コアを規制コア内に嵌入し、両者をたとえば螺合等の手段で組付け固定した状態で規制コアの上端面が基盤筒体の下端面に当接し、さらに支持コアをプリフォームの口筒部に嵌入した状態で、口筒部の上端面が基端筒部の下端面に当接して規制コアの嵌入限界を明確に設定することができる。10

#### 【0035】

##### 【発明の実施の形態】

次に本発明の実施の形態を図面に示す実施例に基いて説明する。図1～図3は本発明の内径規制治具1の第1実施例に関するものであり、図1は全体の縦断面図であり、図2は(a)支持体2、(b)短円筒体6a、(c)多孔質筒体7および(d)先端筒9の4つの部材に分解して示したものであり、また図3はこの内径規制治具1の規制コア5をプリフォーム21の口筒部22に嵌入した状態を示すものである。20

#### 【0036】

図3に示されるPETボトルのプリフォーム21は、口筒部22の外周に、キャップ26を螺合するためのネジ部23、ビルファーブルーフ用キャップの封止リングの係止のための機能を果たすビードリング24およびボトルを保持するためのサポートリング25を有するものである(図7も参照)。なお図3に示される口筒部22は所謂耐熱用口筒部である。

#### 【0037】

この第1実施例の内径規制治具1は、前述したように支持体2、短円筒体6a、多孔質筒体7および先端部9の4つの部材から構成されているが、支持体2は耐熱性合成樹脂製であり、比較的肉厚の短円筒体状である基端筒部3の下端面から、同軸心状に円筒状の支持コア4を垂下設した形状である。また、基端筒部3にたいして支持コア4は同じ内径を有し、外径は縮径したものである。30

#### 【0038】

また、基端筒部3の上部には加熱装置において内径規制治具1を運搬、あるいはプリフォーム21の口筒部22に挿入するための機構部分に連結するための連結治具Bが螺合するための部分が形成されている。(図3参照)また支持コア4の外周面には後述する多孔質筒体5の内周面との間に間隙11を形成するための、比較的幅広の周溝4aが形成されており、さらにこの周溝4aの高さ位置で、等中心角度の4箇所に貫通孔12が形成されている。

#### 【0039】

本実施例では、短円筒体6a、多孔質筒体7および先端部となる先端筒9を組付け結合して、熱処理の際にプリフォーム21の口筒部22の内周面に内接して、内径を規制する円筒状の規制コア5を形成している。このうち短円筒体6aはたとえばステンレス製の短円筒体を使用することができ、本実施例においてその高さは3mmであり、外周面を平滑化処理して表面粗さを小さくして、規制コア5の上端部に平滑部6を配設する。40

#### 【0040】

また、多孔質筒体7は円筒状であり、焼結金属から形成されたものであり筒壁を横断する通気性を有する。(たとえば新東工業株式会社製のポーセラックスII等を使用することができる。)通気性を有する多孔質体としてはセラミック製あるいは耐熱樹脂製のものも使用することが可能であるが、口筒部22の加熱あるいは冷却の際の熱的な追従性の点から50

は比較的熱伝導率の高い焼結金属製のものを用いるのが好ましい。

【0041】

また、規制コア5の先端部を形成する先端筒9は、本実施例ではたとえばPEEK（ポリエーテルエーテルケトン）等の耐熱性樹脂を用いることができ、先端に向けて緩やかに縮径した形状としており、口筒部22への規制コア5の嵌入操作を容易としている。

【0042】

本実施例のように先端部を、たとえば高い耐熱性を有し、蓄熱性の高いPEEK（ポリエーテルエーテルケトン）等の耐熱性合成樹脂で形成すると、内径規制治具1を軽量化できると共に、特に口筒部22の下端にあり肉厚部となるため熱処理が不十分になりやすいサポートリング25部分の結晶化を十分に促進させることができる。

【0043】

上記説明した各部材の組み立ては、支持コア4に短円筒体6a、多孔質筒体7そして先端筒9の順に外嵌してはめ込んで、最後に先端筒9を支持コアの先端に螺合して（図1中のネジ部S1参照）支持体2と規制コア5を組付け結合する。このように組付け結合した状態で、規制コア5の上端面（すなわち短円筒体6aの上端面）は基端筒体3の下端面に当接した状態であり、また支持コア4は規制コア5に内接した状態であり、さらに規制コア5を口筒部22に嵌入する際には、口筒部22の上端面が基端筒体3の下端面に当接して、規制コア5の嵌入限界となる。

【0044】

このようにして、支持体2により円筒状の規制コア5が支持され、プリフォーム21内で規制コア5の姿勢が安定的に確実に確保されると共に、内接する支持コア4により規制コア5の強度を補うことができるので、規制コア5自体の壁の厚さを薄くすることもでき、特に多孔質筒体7の筒壁を薄くすることにより通気性をより大きくすることができる。

【0045】

また、口筒部22の内周面と規制コア5の外周面の接触部分に密閉状に存する空気等は、通気性を有した多孔質筒体7の筒壁、支持コア4に形成した周溝4aにより支持コア4の外周面と多孔質筒体7の内周面が接触する部分に形成された間隙11および周溝4aに形成した貫通項孔12を通して効率良く排出することができる。

【0046】

なお、短円筒体6a自体は通気性を有するものではないが、口筒部22の上端部に内接し、また下端部には通気性を有した多孔質筒体7が隣接した状態にあるので、この短円筒体6aの高さを必要最小限の高さに適切に設定することにより、空気等を上下方向に排出させることができ、この接触部分でのクレータ状凹等の凹凸の発生を抑制することができる。

【0047】

また、本実施例では口筒部22の内周面のビードリング24位置に対応する高さ位置での周溝状の大きな凹みの発生を抑制するため、多孔質筒体7を配置する高さ範囲を、ビードリング24の略下端部までとしているが、この範囲はこのビードリング24、サポートリング23等の口筒部22の形状を考慮して、またクレータ状の凹部等の発生状況を実験的に観察しながら適宜決めることができる。

【0048】

図4は本発明の内径規制治具の第2実施例の多孔質筒体7を示す、縦断面図である。本実施例は他の形状、構成は第1実施例と同様とし、円筒状の多孔質筒体7の外周面の上端部に段部を設けて縮径部8を周状に形成し、この縮径部8をコーティング状に耐熱性塗料等で被覆してコーティング層6bを形成して外表面を平滑にしたものであり、このコーティングした部分が平滑部6の機能を発揮する。

【0049】

第2実施例の構成によって平滑部5を特に別部材とすることなく多孔質筒体7の一部として構成することができ、治具のメンテナンス等を容易にすることができます。

【0050】

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図5は本発明の内径規制治具の第3実施例を示すものであり、第1実施例の支持体2の支持コア4の部分を無くした構成であり、基端筒部3、短円筒体6、多孔質筒体7および先端筒9の4つの部材を3つのネジ結合部S2、S3、S4で結合した構成であり、規制コア5を構成する短円筒体6、多孔質筒体7および先端筒9の組み合わせにより口筒部2の形状あるいは熱処理条件に応じて制治具を対応させることができる。

#### 【0051】

図6は本発明の内径規制治具の第4実施例を示すものであり、第3実施例と同様に支持体2の支持コア4の部分を無くし、規制コア5を、第2実施例のように上端部を縮径部8として、コーティング層6bを形成した多孔質筒体7の1部材で構成したものであり、規制コア5を一部材で構成することができ、メンテナンス等も容易とすることができます。 10

#### 【0052】

#### 【発明の効果】

本発明は、上記した構成となっているので、以下に示す効果を奏する。

請求項1記載の発明にあっては、規制コアを、所定の高さ範囲に亘って、通気性の多孔質材料から形成される多孔質筒体を有する構成とすることにより、加熱処理によって密閉状態となり、膨張した空気等をこの多孔質筒体の筒壁を貫通して排出させることができ、密封された発生ガス等が主要因と考えられる口筒部内部におけるクレータ状の凹部等の凹凸の発生を効果的に抑制することができると共に、規制コアの上端部に外周面を平滑状にした平滑部を有した構成とすることにより、口筒部の上端部内周面を平滑な状態とすることができる、キャップのシール筒片を密着させて口筒部をシールする際におけるシール性を確実に維持確保することができる。 20

#### 【0053】

請求項2記載の発明にあっては、平滑部を設ける範囲を、規制コアの上端面から1～7mの高さ範囲、より好ましくは2～5mmの高さ範囲とすることにより、キャップ体のシール筒片によるシール性を十分に確保すると共に、口筒部の上端部でのクレータ状の凹部等の発生を確実に抑制することができる。

#### 【0054】

請求項3記載の発明にあっては、平滑部の表面粗度をR<sub>max</sub>で10μm以下とすることにより、キャップのシール筒片によるシール性を確実に保持することができる。

#### 【0055】

請求項4記載の発明にあっては、多孔質筒体の上端部の外径を縮径し、コーティング状に被覆して平滑部とすることにより平滑部を特に別部材とすることなく多孔質筒体の一部として構成することができ、治具のメンテナンス等を容易にすることができます。 30

#### 【0056】

請求項5記載の発明にあっては、平滑部を外周面が平滑状である短円筒体で形成することにより外周面を平滑に処理したステンレス製のリング等を使用して容易に平滑部を構成することができる。

#### 【0057】

請求項6記載の発明にあっては、高い耐熱性を有し、蓄熱性の高いPEEK（ポリエーテルエーテルケトン）等の耐熱性合成樹脂で形成することにより、内径規制治具を軽量化できると共に、サポートリング部分の結晶化を十分に促進させることができます。 40

#### 【0058】

請求項7記載の発明にあっては、多孔質筒体を焼結金属で形成することにより、口筒部の加熱および冷却工程における熱的な追随性をよくして、加熱および冷却処理を効率良く実施することができる。

#### 【0059】

請求項8記載の発明にあっては、支持コアを有する支持体を使用することにより、支持コアにより筒状の規制コアが支持され、プリフォーム内での規制コアの姿勢が安定的に確実に確保されると共に、規制コア強度を補うことができるので、規制コア自体の壁の厚さを薄くすることもでき、特に多孔質筒体の壁厚を薄くすることにより通気性をより大きくす 50

ることができる。

【図面の簡単な説明】

【図1】本発明の内径規制用治具の第1実施例を示す、縦断面図。

【図2】図1の治具を分解して示す、縦断面図。

【図3】図1の治具を、規制コアをプリフォームの口筒部に嵌入した状態で示す、縦断面図。

【図4】本発明の内径規制用治具の第2実施例中の多孔質筒体を示す、縦断面図。

【図5】本発明の内径規制用治具の第3実施例を示す、縦断面図。

【図6】本発明の内径規制用治具の第4実施例を示す、縦断面図。

【図7】P E Tボトルにキャップを螺合させた状態を縦断面図で示す、説明図。

【符号の説明】

1 ; 内径規制治具

2 ; 支持体

3 ; 基端筒部

4 ; 支持コア

4 a ; 周溝

5 ; 規制コア

6 ; 平滑部

6 a ; 短円筒体

6 b ; コーティング層

7 ; 多孔質筒体

8 ; 縮径部

9 ; 先端筒

1 1 ; 間隙

1 2 ; 貫通孔

2 1 ; プリフォーム

2 1' ; P E Tボトル

2 2、2 2' ; 口筒部

2 3、2 3' ; ネジ部

2 4、2 4' ; ピードリング

2 5、2 5' ; サポートリング

2 6' ; キャップ

2 7' ; シール筒片

2 7 a' ; シール面

2 8' ; 外装筒

2 9' ; 破断片

3 0' ; 封止リング

S 1、S 2、S 3、S 4 ; ネジ結合部

B ; 連結治具

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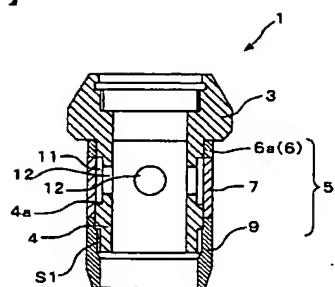
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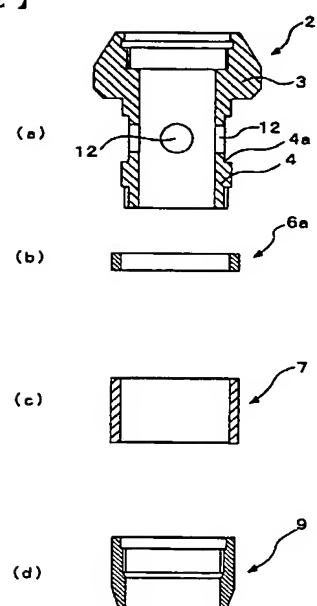
(10)

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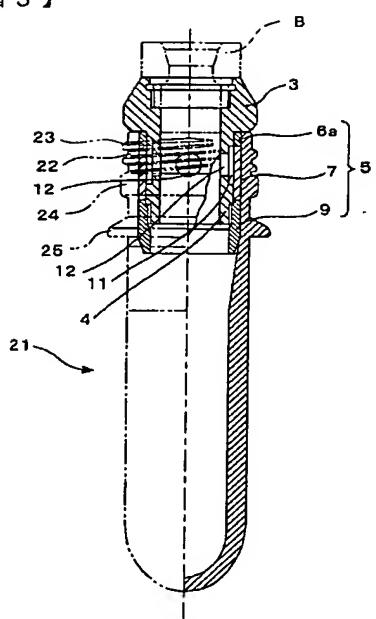
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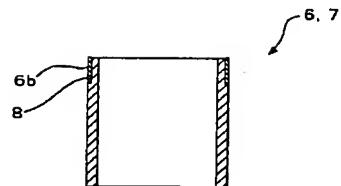
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【図3】



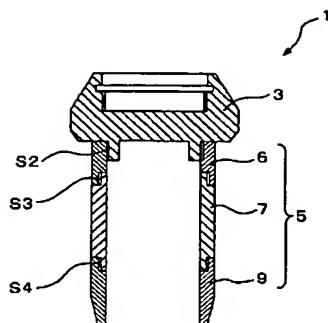
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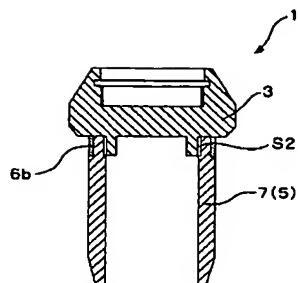
(11)

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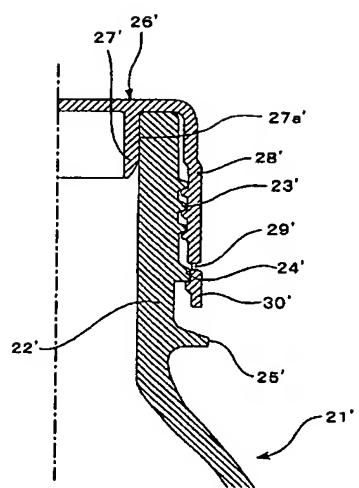
【図5】



【図6】



【図7】



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F ターム(参考) 4F208 AA24 AG07 AH55 AJ02 AJ09 AJ10 AR13 LA02 LA04 LB01  
LH01 LH08 LJ22

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